

1 **Amendment to the Claims**

2 **In the Claims:**

3 Please amend Claims 1 and 10 as follows:

4 1. (Currently Amended) An integrated thermal treatment system for treating a fluid,
5 comprising:

6 (a) a plurality of untreated fluid channels that convey an untreated fluid into the
7 thermal treatment system;

8 (b) a plurality of treated fluid channels that convey a treated fluid out from the
9 thermal treatment system and which are disposed in an alternating relationship with the plurality of
10 untreated fluid channels, such that thermal energy is readily exchanged between the untreated fluid
11 flowing within said plurality of untreated fluid channels and the treated fluid flowing within said
12 plurality of treated fluid channels;

13 (c) at least one fluid inlet in fluid communication with said plurality of untreated
14 fluid channels;

15 (d) at least one fluid outlet in fluid communication with said plurality of treated
16 fluid channels; and

17 ~~(e) a thermal treatment zone in fluid communication with said plurality of~~
18 ~~untreated fluid channels and with said plurality of treated fluid channels, so that the untreated fluid~~
19 ~~enters said thermal treatment zone through said plurality of untreated fluid channels, and the treated~~
20 ~~fluid exits said thermal treatment zone through said plurality of treated fluid channels, said thermal~~
21 ~~treatment zone being integral to said plurality of untreated fluid channels and to said plurality of~~
22 ~~treated fluid channels.~~

23 (e) a stacked plate heat exchanger portion comprising:

24 (i) a plurality of sheets stacked together and separated so that a gap is
25 defined between adjacent sheets, each gap comprising one of said plurality of untreated fluid
26 channels and said plurality of treated fluid channels, such that successive gaps comprise alternating
27 untreated fluid channels and treated fluid channels; and

28 (ii) a thermal treatment zone disposed within the stacked plate heat
29 exchanger, said thermal treatment zone comprising means for thermally treating a fluid, said thermal
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1 treatment zone being in fluid communication with each untreated fluid channel and with each treated
2 fluid channel.

3 2. (Original) The thermal treatment system of Claim 1, further comprising an insulated
4 housing that substantially encloses said plurality of untreated fluid channels, said plurality of treated
5 fluid channels, and said thermal treatment zone, thereby substantially reducing thermal energy
6 exchanged between said thermal treatment system and an environment external to said thermal
7 treatment system.

8 3. (Original) The thermal treatment system of Claim 2, wherein said insulated housing
9 comprises a plurality of aerogel panels.

10 4. (Original) The thermal treatment system of Claim 1, further comprising a catalytic
11 treatment zone disposed adjacent to said thermal treatment zone and within at least one of each of
12 said plurality of untreated fluid channels and each of said plurality of treated fluid channels; and
13 wherein substantial heat provided by said thermal treatment zone facilitates a catalytic conversion by
14 said catalytic treatment zone.

15 5. (Original) The thermal treatment system of Claim 4, wherein said catalytic treatment zone
16 comprises a noble metal catalyst that reduces a temperature required to oxidize an organic chemical
17 contaminant entrained within the untreated fluid.

18 6. (Original) The thermal treatment system of Claim 5, wherein said thermal treatment zone
19 is maintained at a temperature in excess of 300 degrees Celsius.

20 7. (Original) The thermal treatment system of Claim 1, wherein said thermal treatment zone
21 comprises at least one electric resistive heating element.

22 8. (Original) The thermal treatment system of Claim 1, wherein said thermal treatment zone
23 has an operating temperature in excess of 600 degrees Celsius.

24 9. (Original) The thermal treatment system of Claim 1, wherein said thermal treatment zone
25 comprises at least one chiller that cools the untreated fluid sufficiently to enable a condensable
26 compound to be condensed and thereby removed from said untreated fluid.

27 10. (Currently Amended) The thermal treatment system of Claim 1, wherein ~~the plurality of~~
28 ~~untreated channels and the plurality of treated channels are defined between a plurality of sheets~~
29 ~~stacked together in spaced apart layers so that a gap is formed between adjacent sheets, each gap~~
30

1 ~~comprising one of an untreated fluid channel and a treated fluid channel, such that when a gap~~
2 ~~between two adjacent sheets comprises an untreated fluid channel, an adjacent gap comprises a~~
3 ~~treated fluid channel~~ each of the plurality of sheets includes at least one orifice, the thermal treatment
4 zone being disposed within the orifices in the sheets.

5 11. (Original) The thermal treatment system of Claim 10, wherein each of said plurality of
6 sheets comprises a metal foil.

7 Claims 12-31 (Previously Cancelled)

8 32. (Original) Apparatus for thermally treating a fluid, including an integrated heat
9 exchanger and thermal treatment zone, said apparatus comprising:

10 (a) a plurality of untreated fluid channels that convey an untreated fluid into the
11 apparatus;

12 (b) a plurality of treated fluid channels that convey a treated fluid from the apparatus
13 and which are disposed in an alternating relationship with the plurality of untreated fluid channels, so that
14 thermal energy is readily transferred to the untreated fluid flowing within said plurality of untreated fluid
15 channels from the treated fluid flowing within said plurality of treated fluid channels;

16 (c) at least one fluid inlet in fluid communication with said plurality of untreated
17 fluid channels;

18 (d) at least one fluid outlet in fluid communication with said plurality of treated
19 fluid channels;

20 (e) a stacked plate heat exchanger portion comprising:

21 (i) a plurality of sheets stacked together and separated so that a gap is defined
22 between adjacent sheets, each gap comprising one of said plurality of untreated fluid channels and said
23 plurality of treated fluid channels, such that successive gaps comprise alternating untreated fluid channels
24 and treated fluid channels, each sheet having a thickness and a characteristic heat transfer that enables
25 thermal energy to be more readily exchanged between adjacent gaps through a sheet rather than along the
26 sheet, each sheet having at least one orifice disposed such that the orifices of adjacent sheets are in
27 alignment; and

28 (ii) at least one face of the stacked plate heat exchanger being in fluid
29 communication with a source of untreated fluid and a volume into which treated fluid is discharged,
30 said at least one face being disposed along an edge of each sheet;

1 (f) a thermal treatment zone portion disposed within the orifices in the sheets, said
2 thermal treatment zone comprising means for thermally treating a fluid, said thermal treatment zone
3 being in fluid communication with each untreated fluid channel and with each treated fluid channel;

4 (g) means for enabling a flow of fluid through said apparatus; and

5 (h) at least one cross-flow header disposed adjacent to said at least one face of said
6 stacked plate heat exchanger, said at least one cross-flow header being in fluid communication with
7 said means and with one of each untreated fluid channel and each treated fluid channel.

8 33. (Original) The apparatus of Claim 32, wherein said stacked plate heat exchanger further
9 comprises at least one fluid-blocking structure disposed in each untreated fluid channel and in each
10 treated fluid channel, such that:

11 (a) when said at least one cross-flow header is in fluid communication with each
12 untreated fluid channel:

13 (i) said at least one fluid-blocking structure disposed in each untreated
14 fluid channel prevents the untreated fluid from entering into each untreated fluid channel via said at
15 least one face, and enables the untreated fluid to enter into each untreated fluid channel via said at
16 least one cross-flow header; and

17 (ii) said at least one fluid-blocking structure disposed in each treated fluid
18 channel prevents a treated fluid from entering into said at least one cross-flow header, and enables
19 treated fluid to exit said apparatus via said at least one face;

20 (b) when said at least one cross-flow header is in fluid communication with each
21 treated fluid channel:

22 (i) said at least one fluid-blocking structure disposed in each untreated
23 fluid channel enables an untreated fluid to enter into each untreated fluid channel via said at least one
24 face, and prevents untreated fluid from entering into said at least one cross-flow header; and

25 (ii) said at least one fluid-blocking structure disposed in each treated fluid
26 channel prevents the treated fluid from exiting said apparatus via said at least one face, and enables
27 the treated fluid to enter into said at least one cross-flow header.

28 34. (Original) The apparatus of Claim 32, wherein said means for enabling a flow of fluid
29 comprises at least one of a pump, a fan, and an impeller.
30

1 35. (Original) The apparatus of Claim 32, wherein said means for thermally treating a fluid
2 comprises a chiller for condensing a condensable material to remove the condensable material from
3 the untreated fluid.

4 36. (Original) The apparatus of Claim 32, wherein said means for thermally treating a fluid
5 comprises a heater for deactivating at least one of a biological contaminant and a chemical
6 contaminant contained within said untreated fluid.

7 37. (Original) The apparatus of Claim 36, wherein said heater comprises at least one electric
8 resistive element.

9 38. (Original) The apparatus of Claim 36, further comprising a catalytic treatment zone
10 disposed adjacent to said thermal treatment zone and to one of each of said plurality of untreated fluid
11 channels and each of said plurality of treated fluid channels, so that heat provided by said thermal
12 treatment zone facilitates a catalytic reaction in said catalytic treatment zone.

13 39. (Original) The apparatus of Claim 36, further comprising an acid gas-absorbent material
14 disposed in said treated fluid channel, such that any acid gas generated in said thermal treatment zone
15 is removed from the treated fluid when that treated fluid passes through said acid gas-absorbent
16 material.

17 40. (Original) The apparatus of Claim 32, wherein said untreated fluid comprises air.

18 41. (Original) The apparatus of Claim 32, wherein said sheets are one of quadrilateral in
19 shape, and substantially round in shape.

20 42. (Original) The apparatus of Claim 32, wherein said at least one cross-flow header
21 comprises a half tube.

22 43. (Original) The apparatus of Claim 32, wherein said at least one orifice in each sheet is
23 disposed proximate one of a center of each sheet, and a center axis of each sheet.

24 44. (Original) The apparatus of Claim 32, wherein said sheets comprise a metal foil.

25 45. (Original) The apparatus of Claim 32, further comprising an insulated housing that
26 substantially encloses said stacked plate heat exchanger and said thermal treatment zone.

27 46. (Original) The apparatus of Claim 32, wherein said sheets comprise surface features that
28 extend outwardly of a planar surface of the sheets and separate adjacent sheets, thereby aiding in
29 maintaining said gap between adjacent sheets.
30

1 47. (Original) The apparatus of Claim 46, wherein said surface features comprise a plurality
2 of dimples formed into each sheet, such that a height of each dimple substantially equals a thickness
3 of said gap.

4 48. (Original) The apparatus of Claim 32, wherein said sheets include surface features that
5 stiffen each sheet.

6 49. (Original) The apparatus of Claim 48, wherein said surface features comprise at least one
7 of a plurality of ribs extending substantially perpendicular to a direction of a flow of fluid in said
8 apparatus, and a plurality of ribs extending substantially parallel to a direction of a flow of fluid in
9 said apparatus.

10 50. (Original) Apparatus for thermally treating a fluid, including an integrated heat exchanger
11 and thermal treatment zone that substantially reduces energy required to thermally treat a fluid,
12 eliminates a need for seals and a header for connecting a heat exchanger section with a thermal
13 treatment section, and has at least one of a header-less fluid inlet and a header-less fluid outlet, thereby
14 eliminating a need for both a fluid inlet header and a fluid outlet header, comprising:

15 (a) a heat exchanger, comprising:

16 (i) a plurality of metal foil sheets stacked together in spaced-apart layers
17 so that a gap is defined between adjacent metal foil sheets, each gap comprising one of an untreated
18 fluid channel and a treated fluid channel, untreated fluid channels alternating with treated fluid
19 channels, each metal foil sheet having a thickness that enables thermal energy to be readily
20 exchanged between adjacent untreated and treated fluid channels and including at least one orifice,
21 orifices in adjacent metal foil sheets being aligned;

22 (ii) at least one fluid inlet in fluid communication with each untreated fluid
23 channel and a volume of untreated fluid; and

24 (iii) at least one fluid outlet in fluid communication with each treated fluid
25 channel and a volume into which a treated fluid is discharged;

26 (b) at least one thermal treatment unit integrated into said heat exchanger,
27 disposed within the orifices of the metal foil sheets;

28 (c) a plurality of insulated panels at least partially enclosing the heat exchanger,
29 such that at least an upper surface and a lower surface of the heat exchanger are insulated, and such
30

1 that at least one surface of the heat exchanger is in fluid communication with one of a volume of
2 untreated fluid, and a volume into which a treated fluid is discharged;

3 (d) means for driving a fluid through said heat exchanger, said means being in
4 fluid communication with one of each untreated fluid channel and each treated fluid channel, and
5 with one of the volume of untreated fluid, and the volume into which a treated fluid is discharged;
6 and

7 (e) a header system in fluid communication with said means for driving, and with
8 only one of each untreated fluid channel and each treated fluid channel.

9 Claims 51-69 (Previously Cancelled)